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(72) Inventor FREDERICK BRYDONE REED



(54) MEANS FOR SIMULATING A FLAME OR FIRELIGHT EFFECT

(71) We, T. I. SUNHOUSE LIMITED, formerly known as RADIATION SUNHOUSE LIMITED, a British Company, of 34 New Street, Walsall, Staffordshire, WS1 3DL, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to means for simulating a flame or firelight effect.

According to the invention, means for simulating a flame or firelight effect comprises: (a) one or more light sources controlled by control means for automatically causing current supplied to the said source or sources to be of an intermittent or varying nature whereby said source or sources emit flashing or varying-intensity light, the or each of said light source or light sources having operatively associated therewith a rotary flicker device for modifying the light effect from said source; and (b) one or more light sources which is or are supplied, in use, with a steady current and which, or each of which, is itself associated with a, or a respective, rotary flicker device.

Preferably the said control means is an electronic device. Preferably the light sources are disposed so as, in use, to direct light between a reflector and a viewing screen; and preferably each flicker device is operable by heat from the respective light source with which it is associated. preferably, also, the or each flicker device associated with the light source or light sources controlled by the control means has irregularly-shaped and/or irregularly-arranged light apertures.

The aforesaid means, constructed in accordance with the invention, for simulating a flame or firelight effect may if desired form part of an electric heater, for example an electric convector heater, or an

electric fire.

Means constructed in accordance with the invention may, for example, comprise, disposed so as to direct light between a rear reflector and a front viewing screen, (a) one or more, for example two, inner lamps associated, or each associated, with a rotary flicker device which has irregularly shaped and/or arranged light apertures, and supplied, or each supplied, with current which is automatically caused by an electronic control device to be of an intermittent nature whereby the or each inner lamp emits flashes of light in rapid succession, and (b) a plurality of outer lamps, which are themselves associated with rotary flicker devices and flank the said inner lamp or lamps, and are supplied with a steady current.

In the accompanying drawings, which show, by way of example, an embodiment constructed in accordance with the invention:

Figure 1 is a diagrammatic vertical sectional view through said exemplary embodiment; and

Figure 2 is a diagrammatic horizontal section through said embodiment, with an electronic control circuit shown schematically in block diagram form.

Referring to the drawings, means for simulating a flame or firelight effect comprises, mounted in a casing (not shown), a pair of red or orange coloured inner lamps 1 flanked, as shown in Figure 2, by a pair of red or orange coloured outer lamps 2, all four of these lamps 1, 2 being disposed so as to direct light between a rear reflector 3 and a front viewing screen 4. The reflector 3 is, in this embodiment, of a construction, having concave reflecting areas of upwardly-extending flame shape, described in our Patent Specification No. 968568, and the viewing screen 4 is in this embodiment of a construction, in which

said screen is in the form of a transparent or translucent panel, having a light-diffusing surface formed thereon by producing on the panel a multiplicity of closely-adjacent thin horizontal or near horizontal broken or unbroken lines extending from one side to the other of the panel, described in our Patent Specification No. 957591. Imitation fuel 5, simulating coal or wood logs, is disposed in front of the lower part of the screen 4.

Each of the four lamps 1, 2 has operatively associated therewith a rotary flicker device in the form of a spinner 6 or 7, mounted above the respective lamp and caused to rotate by the heat from the said lamp when the latter is alight. The spinners 6 are associated one with each of the two inner lamps 1 and, as shown in Figure 2, have light apertures 8 which are irregularly shaped, whilst the spinners 7 are associated one with each of the two outer lamps 2 and have regularly shaped and spaced light apertures therein.

The two inner lamps 1 are electrically connected to an electronic control device 9 for automatically causing the energising current supplied in use to said lamps 1 to be of an intermittent nature, the arrangement being such that, in operation, each lamp 1 emits flashes of red or orange light in rapid succession, for example at a rate of two flashes per second.

The two outer lamps 2, on the other hand, are, in operation, supplied with a steady energising current, whereby they emit a steady red or orange light when energised, such steady light effect being modified by the respective spinners 7 to result in a flickering light effect.

When the said illustrated embodiment is in operation, with the lamps, 1 under the control of the device 9, emitting flashes of red or orange coloured light passing through the irregularly shaped apertures of the rotating spinners 6, and with the lamps 2 emitting red or orange coloured light passing through the apertures of the spinners 7, there results an effect visible to a viewer, viewing the reflector through the screen 4, as an attractive and realistic flickering flame effect of a continuously-changing nature. The apparatus shown does not utilise a motor for its operation, so that a continuous and possibly distracting motor noise, sometimes present in the case of motor-driven means for producing a simulated flame effect, is thereby avoided.

The electronic control device 9 comprises, arranged in a supply circuit from an A.C. mains supply input 10 to the lamps 1, a solid-state switch in the form of a triac 11 controlled by a triac firing circuit 12 driven by a random signal generator 13.

Means are provided whereby both the frequency and the mark-space ratio of pulses emitted from the signal generator 13 to the triac firing circuit 12 are variable. The triac firing circuit may incorporate zero-voltage switching to reduce radio-frequency interference. In the particular example now being described the lamps 1 have a nominal rating of 60 watts, the triac 11 has a rating of 2.0 amps., 400 volts, and the A.C. supply is 240 volts at a frequency of 50Hz.

In the embodiment shown the lamps 1 flash in unison and are controlled by a single triac 11, but if desired the signal generator 13 may be arranged to control a plurality of triac firing circuits each controlling a different triac in turn controlling a respective one of the lamps, thereby providing independent triac control of the lamps which may if desired be arranged to flash out of phase with each other.

The electronic control device may be constructed and arranged in any other suitable manner.

The lamps may be arranged in any other suitable manner; and the light effect may be of any other suitable colour or colours.

Instead of their being two lamps controlled so as to emit flashes of light, there may be one, or three or more, lamps so controlled. Instead of providing two lamps emitting a steady light, one or three or more of such lamps may be provided.

If required, the light apertures in the or each flicker device associated with the lamp or lamps controlled to emit flashes of light may be regularly shaped but irregularly spaced.

Instead of the electronic control device automatically causing the supply current to one or more lamps to be an intermittent current, said device may be constructed so as automatically to cause said supply current to be of a continuously varying nature without actual interruption thereof.

The automatic control means for causing supply current to be of an intermittent or varying nature may, if desired, be otherwise than in the form of an electronic device.

WHAT WE CLAIM IS:—

1. Means for simulating a flame or fire-light effect comprising:
 - (a) one or more light sources controlled by control means for automatically causing current supplied to the said source or sources to be of an intermittent or varying nature whereby said source or sources emit flashing or varying-intensity light, the or each of said light source or light sources having operatively associated therewith a rotary flicker device for modifying the light effect from said source;

- and (b) one or more light sources which is or are supplied, in use, with a steady current and which, or each of which, is itself associated with a, or a respective, rotary flicker device.
2. Means for simulating flame or firelight effect, as claimed in claim 1, wherein the said control means is an electronic device.
- 10 3. Means for simulating a flame or firelight effect, as claimed in claim 1 or 2, wherein the said light sources are associated with a reflector and a viewing screen and are disposed so as, in use, to direct light between said reflector and said viewing screen.
- 15 4. Means for simulating a flame or firelight effect, as claimed in any one of the preceding claims, wherein each flicker device is operable by heat from the respective light source with which it is associated.
- 20 5. Means for simulating a flame or firelight effect, as claimed in any one of the preceding claims, wherein the or each flicker device associated with the light source or light sources controlled by the control means has irregularly-shaped and/or irregularly-arranged light apertures.
- 25 6. Means for simulating a flame or firelight effect, as claimed in claim 5, wherein the or each flicker device associated with the light source or light sources supplied, in use, with a steady current has regularly-shaped and regularly-spaced light apertures.
- 30 7. Means for simulating a flame or firelight effect, comprising a rear reflector and a front viewing screen and, disposed so as, in use, to direct light between said rear reflector and said front viewing screen, (a) one or more inner lamps controlled by control means and associated, or each associated, with a rotary flicker device which
- 35 45 has irregularly shaped and/or irregularly-arranged light apertures, and, in use, supplied, or each supplied, with current which is automatically caused by said control means to be of an intermittent nature whereby the or each inner lamp emits flashes of light in rapid succession, and (b) a plurality of outer lamps, which are themselves associated with rotary flicker devices and flank the said inner lamp or lamps,
- and are, in use, supplied with a steady current.
8. Means for simulating a flame or firelight effect, as claimed in claim 7, wherein the said control means is an electronic device.
9. Means for simulating a flame or firelight effect, as claimed in claim 7 or 8, wherein each of the flicker devices associated with the outer lamps has regularly shaped and spaced light apertures.
- 60 10. Means for simulating a flame or firelight effect, as claimed in claim 2 or 8, or in any one of claims 3 to 6, insofar as it is dependent upon claim 2, or in claim 9 insofar as it is dependent upon claim 8, wherein the electronic control device comprises a triac controlled by a triac firing circuit driven by a random signal generator.
- 65 11. Means for simulating a flame or firelight effect, as claimed in claim 10, wherein the electronic control device controls a plurality of lamps and comprises a random signal generator arranged to control a plurality of triac firing circuits each controlling a different triac in turn controlling a different one of said lamps, whereby said lamps can be caused to flash out of phase with each other.
- 70 12. Means for simulating a flame or firelight effect, as claimed in claim 10 or 11, wherein both the frequency and the mark-space ratio of pulses emitted from the signal generator to the or each triac firing circuit are variable.
- 75 13. Means for simulating a flame or firelight effect, as claimed in claim 10, 11 or 12, wherein the or each triac firing circuit incorporates zero-voltage switching.
14. Means for simulating a flame or firelight effect, substantially as herein described with reference to the accompanying drawings.
15. An electric heater having means for simulating a flame or firelight effect constructed in accordance with any one of the preceding claims.
- H. N. & W. S. SKERRETT,
Chartered Patent Agents,
Rutland House,
148 Edmund Street,
Birmingham B3 2LQ.
Agents for the Applicants.

